



**HAMMERHEAD
TRENCHLESS
UNIVERSITY**

LATERAL CIPP BLUELIGHT CURE

INSTRUCTOR GUIDE

Version: 2023

CONTENTS

CONTENTS	2
GUIDEPURPOSE	3
WELCOME & INTRODUCTION	4
REVIEW EQUIPMENT, TOOLS, & MATERIALS.....	5
EQUIPMENT OPERATION BASICS	7
KNOT TYING TECHNIQUES	8
CALCULATIONS & OPERATION	9
RECAP & SET AGENDA.....	10
LIVE JOB IN FIELD.....	15

GUIDE PURPOSE

PREPARE FOR AND INSTRUCT THIS COURSE

The purpose of this guide is to help you prepare for and instruct a three-day training session on lateral CIPP installation using the Bluelight LED curing system. There are a few things you should do to prepare for your next training session:

1. Ensure that all the necessary equipment, tools, and materials are available at the training site.
2. Familiarize yourself with the course structure and activities.
3. Prepare lengths of pull strap and calibration tube for each trainee for knot-tying practice.

As you instruct the course, you can use the scenarios listed in this guide to allow trainees to practice each step of the installation process.

HOW THIS GUIDE IS ORGANIZED

This guide is organized by day, that structure is flexible according to the needs of each group of trainees that you train. If trainees have little to no experience with inversion but do well with measurements, you may need to spend more time practicing that and less time on calculations. Similarly, if trainees plan to purchase wet-out liners, wet out procedures may be skipped.



When you see this icon, it signifies an activity. You should avoid skipping activities unless it is a step the trainees won't take (e.g., wet out process when using pre-wet-out liners).



When you see this icon, it signifies group discussion.

DAY 1

WELCOME & INTRODUCTION

WELCOME

Arrive early – at least 10-15 minutes – to set the expectation that being on time is important to training. This also gives you time to review any notes you have about the trainee group.

Go through introductions, starting with yourself.

SET EXPECTATIONS

Ask trainees to participate according to the following, if at all possible:

1. Stay off phones unless necessary/essential
2. Shop days will include two fifteen-minute breaks and hour lunch
3. Take LMS training before Day 2

DISCUSS TRENCHLESS EXPERIENCE

Work on building rapport – get to know the trainees, learn about them personally, their region, etc. Bridge the gap between you and trainees by sharing and listening. Use this time to study each trainee's body language and nonverbal cues; this should give you an idea of who is confident, who is nervous, who might be a good team leader, etc.



Ask trainees to share any experience they have with trenchless technology, especially CIPP. If they are experienced with any CIPP, tie their previous experience in to what they'll be learning with BlueLight. Inversion experience is particularly useful, as is point repair.

It's important to connect what trainees currently know with what they're going to learn from you, as that makes it easier for their brains to store this new information in an efficient way. If they don't have any previous trenchless experience, compare CIPP lining to something they likely have experienced or seen.

Ask trainees if there are any parts of the process that they are excited to learn or nervous about trying.

REVIEW EQUIPMENT, TOOLS, & MATERIALS

EQUIPMENT

Review equipment list with trainees and make sure all listed equipment is present.

- Bluelight LED CIPP Lining System
- Light Reel(s)
- Touchscreen Display
- Power Supply
- Electrical Cords
- Inversion Drum
- Inversion Hose
- Drum Nozzle(s)
- Side Entrance (Y Entrance)
- Dryer
- Generator/ Electrical Supply (4kw/min)
- Air Assembly
- Air Compressor (min 70CFM & 100 PSI)
- Air Hoses
- Electronic Scale
- Inspection Camera
- Pipe Cleaner (miller/hydrojetter)
- Extension Cord(s)

WET OUT EQUIPMENT

If the company is not using pre-wet-out liner, also ensure that the following are on-hand:

- Drill & Mixing Paddle
- Wet Out Table (or other calibration device)
- Vacuum Assembly, Hoses, & Suction Cups

RECOMMENDED TOOLS

Make sure the following recommended tools are on-hand:

- Impact Driver
- Sockets for Impact Driver
- Heavy Duty Scissors (fabric/carpet)
- Utility Knife and Blades
- 50', 100', and 300' Tape Measures
- Black Permanent Marker
- Speed Square
- HammerHead App – instruct trainees to download to phones

MATERIALS

Review the materials list, emphasizing consumables. Make sure the following materials are on-hand:

- Liner
- Calibration Tube
- Resin
- White Mule Tape
- Tape
- Hose Clamps
- Mineral Oil
- Pump Sprayer for Mineral Oil
- #64 Rubber Bands
- Isopropyl Alcohol (91% or greater)
- Acetone
- Gloves
- Black Contractor Garbage Bags
- Spare Glass for Light Head
- Spare Gaskets for Light Head
- Bluelight Cleaning Kit

As you review consumables, explain the following:

1. **Liner** – Discuss storage and use. Explain the construction of the BL Liner and why it is important to use vs standard felt liners – delamination. Remind the customer/trainee that 3D is ONLY available in 4". LED Flex liner has now been added to the available options 3" (3"-4") and 4" (4"-6") improved aesthetics on the installation and final cure around fittings.
2. **Resin** – Storage and use at 68-77F. Cover shelf life of both resin and pre wet out liners – recommended storage requirements. (A chart or data sheet should be included with each resin or pre wet out liner order).
3. **Calibration Tube** – Explain why ONLY clear calibration tube is used – penetration of light.
4. **Pull Strap** – Explain why they should use only ¾" White mule tape – allows light to transmit through it.

EQUIPMENT OPERATION BASICS

WET OUT TABLE

Operating procedures to be covered: speed, shim/gap selection, roller function, and directional selection.

Equipment requirements: air and electricity. Information located on the HH Rehab App for gap settings. 3m/min is the recommended pace for wet out of BL Liner.

VACUUM

Discuss intended use, reason for use, how to set up and adjust. Also show how to cut into liner to create a single or multiple vacuum ports. Show use of patch kits. Monitor the amount of vacuum via the gauge on the venturi as well as physical touch/visual appearance of vac process.

INVERSION DRUM

Review Features and Benefits: door, high psi blow-off, ability of changing the wheel from side to side. Demonstrate drum set up for BL equipment.

BLUELIGHT POWER PACK

Walk through setup for connections.

BLUELIGHT DISPLAY

Explain the safety features. Walk trainees through liner install set up using different lengths and sizes of liners. Show them how to turn down power if needed – extreme ambient heat (weather) or damaged LED's. Power on unit prior to install to ensure camera/unit are turning on and functions. Recording functions.

LIGHT REELS

1. **40m reel:** Demonstrate how to clean the glass (both inside and outside along with how to clean the LED's). O-ring inspection. What to do if a LED burns out. What cleaners and brushes are acceptable for cleaning use (need further instruction/recommendation). Explain what can occur if the wrong liner lubricant is used (mineral v veg oil).
2. **50m reel:** Review propulsion unit "wheel" size differences between the light reel options.

3. **100m reel:** Explain why the 100m reel does not have a fiberglass rod/stiffener and the pull in technique.

KNOT TYING TECHNIQUES

PULL STRAP KNOT

Show trainees how to create a slip knot in the pull strap.

To create the slip knot, make a loop with one end of the pull strap and twist it one half turn. Reach through the loop and pull some of the longer piece of the pull strap through to create a second loop. Pull the tail end while holding the second loop to tighten the first loop.

After demonstrating, allow each trainee to practice.

CALIBRATION TUBE KNOT

Demonstrate the calibration tube knotting technique and allow trainees to practice.

Create a Z fold using about 18-20 inches at the end of the calibration tube. Tie this portion of the calibration tube in a standard knot, getting it as tight as possible, and leave about 6-8 inches of calibration tube after the knot. If the knot slips at all, that 6-8 inches prevents it from coming undone. Get help from a trainee to make the knot as tight as possible.

Cut the knotted end of the calibration tube at a 45-degree angle. Doing so helps prevent the end from becoming caught in the nozzle during pullback.

Slide the loop of the pull strap slip knot over the knotted calibration tube and tighten the slip knot behind the calibration tube knot. Use tape to secure the knots from just behind the slip knot down to the beginning of the 45-degree angle cut in the calibration tube.

SECURING TO THE SPINDLE

Walk through the process of tying the materials to the spindle inside the drum.

CALCULATIONS & OPERATION

INSTALLATION SHEET

Perform multiple dry-run exercises with the install sheet: provide a scenario and have each trainee fill out their own form. If answers differ, make sure to review each difference and identify the correction.



Ask trainees what their most typical scope of work is. Build the scenarios from that information. Example: In Wisconsin, we typically see 4" cast to 6" clay in laterals. A scenario from this could be a 20 ft. shot, with 10 ft being 4" and 10 ft being 6".

HAMMERHEAD APP

Ensure each trainee has the app downloaded. Work through the calculator and tech data.



Continue the previous scenario's calculations for resin.

Encourage trainees to practice tying knots and doing calculations as homework if any seem to need further practice before doing an above-ground installation.

END OF DAY 1

DAY 2

RECAP & SET AGENDA

RECAP DAY 1 INFORMATION

Remind trainees what they learned in Day 1 and ask if they have any questions or need clarification on any of those topics.

- Knot tying techniques
 - Calibration tube
 - Securing to spindle
 - Pull strap
- Equipment, tools, and materials used for installation
- Installation sheet calculations for dry consumables
- HammerHead App calculations for wet out

REVIEW AGENDA FOR DAY 2

20ft above-ground installation – each learner will practice each step of the process.

- Jobsite setup
- Complete installation sheet
- Calculate resin using HH App
- Wet out
- Load drum
- Invert liner, calibration tube, pull strap
- Bluelight cure
- Inspect cured installation

PREPARE FOR INSTALLATION

CALCULATIONS

You may choose to practice using the installation sheet and HammerHead app based on your assessment of the trainees' calculations from the day before, as well as if they have further questions about those calculations today.



Based on the scope of work information that you gathered in the first day of training, create a few more scenarios for practice calculations. Have trainees calculate the dry consumables and resin needed for the day's 20ft above-ground installation. This should be completed individually. Compare answers and provide feedback.

PREPARE DRY CONSUMABLES

Instruct and assist trainees as they lay out, mark, and cut liner, calibration tube, and pull tape based on their calculations. Use the diagram on the installation sheet, which can be found in their Trainee Guides, to show which markings should be made on the liner.

- Emphasize attention to detail
- Note, use, and explain the liner diagram at the bottom of the installation sheet
- Ensure marking and measuring is consistent and in correct order (shown on installation sheet)
- Measure twice, cut once!



Have each knot – calibration tube, spindle, pull tape – tied by a trainee. You can ask for volunteers or assign individuals, whichever you prefer for that group.

Preload the inversion drum with calibration tube and pull tape if possible, depending on length of shot and size of drum.

PREPARE FOR WETOUT (IF NOT USING PRE-WET OUT LINER)

Demonstrate how and explain why we agitate/mix a new bucket of resin upon opening. Measure the resin using a digital scale.



Set up the vacuum port on the liner and explain the importance of vacuum impregnation. Explain the traffic cone funnel method for loading resin into the liner. Discuss how to control both the vacuum and resin slug during this process. Let the trainees load the resin and provide feedback as they do so.

WETOUT PROCESS (IF NOT USING PRE-WET OUT LINER)

Walk trainees through the process to run the liner through the wet out table. Focus on setting the shim/gap size and running the table at the correct speed. Explain how to handle excess resin or insufficient resin.

JOBSITE SETUP

Explain how to select the best locations for power supply, inversion drum, compressor, dryer, and Bluelight unit. Review all actions to be taken before beginning an install, including accessing the pipe, cleaning the pipe to CIPP specifications, and assessing the pipe for CIPP suitability.

Walk through all system connections for power and air. Reference the Bluelight User Guide, which trainees can find in the appendix of their Trainee Guide. It has a detailed list of connections to be made.

Remind trainees to use PPE and follow all safety requirements according to local ordinances.

LOAD THE DRUM

Explain and demonstrate best practices for maximizing drum capacity. Emphasize cleanliness and confirming the distance from the nozzle to the host pipe.

INSTALLATION

INVERT LINER, CALIBRATION TUBE, & PULL STRAP

Explain and demonstrate use of a Calibration tube “leader.” Emphasize cleanliness and confirming the distance from nozzle to host pipe entrance. Discuss the best practice of using as low psi as possible during install – pipe will dictate the inversion pressure. Pressure and speed for both liner/cal.

Teach that, if necessary, the pull in method may be used for the calibration tube and pull strap.

SET PRESSURE FOR DWELL

Show trainees how to set the pressure for a 10-minute dwell to ensure that the liner and calibration tube are pressed against the pipe as much as possible. Explain that 10 PSI is usually the best pressure for dwell, but this depends on the pipe conditions, including any bends or transitions.

Demonstrate the process to shift the air supply from the inversion drum to the Bluelight reel, emphasizing switching the air at the same time. Identify each connection that should be opened or closed.

Set a 10-minute timer on the display. Maintain pressure for a full 10 minutes and turn off the alarm.

DEPLOY THE LIGHT HEAD

Demonstrate how to unlock the propulsion unit and deploy the light head using the push method. Explain the importance of watching the monitor and looking for the “tail” of the calibration tube.



Allow trainees to practice pushing the light head and provide feedback.

Lock the motor and explain how to adjust the tightness on the PEX at the propulsion unit.

INPUT JOB INFORMATION & BEGIN PULLBACK

Walk through setting the pipe size, liner thickness, and distance into the control unit. Emphasize the need to confirm accuracy based on the scope of the installation.

Validate that air pressure and temperature are blue. Explain the importance of this and how the system reacts.

Explain the time limit and timer. Begin pullback. Strongly emphasize the importance of monitoring pressure and temperature during pull.

Review the alarms that may go off during pullback and how to respond.

END OF DAY 2

DAY 3

LIVE JOB IN FIELD

LATERAL CIPP INSTALLATION WITH BLUELIGHT CURE

This entire day is dedicated to a live installation on a jobsite. The trainees should be doing all the work with guidance and feedback from you. Allow them to use the Bluelight User Guide to direct their work, which should be enough support to make the need for your guidance minimal.

PRACTICAL ASSESSMENT WITH RUBRIC

Use the rubric on the following page to score the performance of each trainee during installation. It is important to allow each trainee to perform each action at some point during training so that you can score their performance.

Send the completed rubric to HammerHead (training@hhtrenchless.com) within 1 week of training so that certifications can be recorded in HammerHead University Online and shared with trainees.

Bluelight CIPP Certification Rubric

DATE: _____

INSTRUCTOR: _____

LOCATION: _____

Criteria:	Trainee 1:	Trainee 2:	Trainee 3:	Trainee 4:
Name →				
Email address →				
Identifies pipe conditions required to install CIPP. Only installs in properly cleaned pipe without large voids or active infiltration.				
Tests all equipment and makes sure fuel tanks are full before installation.				
Hooks up all air hoses and electrical connections correctly.				
Completes installation sheet to calculate required liner, calibration, and pull tape amounts. Calculates resin amount required using the HammerHead app.				
Correctly installs Y entrance and propulsion unit, handling the light head with care.				
Preloads pull tape and calibration tube into inversion drum, spraying mineral oil for lubrication.				
Wets out liner with correct amount of resin at appropriate and consistent saturation.				
Loads saturated liner into inversion drum, spraying with mineral oil for lubrication.				
Cuffs the liner 4" and attaches with two or more hose clamps.				
Uses appropriate PSI to invert liner, then calibration tube.				

Set a 10-minute dwell timer before beginning the cure process.				
Correctly input pipe diameter, liner thickness, and repair length into Bluelight controls, then initiate pullback by pressing the power button.				
Monitors power, pressure, temperature, and pull speed throughout the duration of the pull.				
Guides tubing back into storage drum during pullback.				
Complete a cooldown of at least 10 minutes with light head redeployed 50% or more down the repair length.				
Manually pull the light head completely into the propulsion base housing and properly store housing and light head.				

NOTES: